



Knowledge, perspectives and health outcome expectations of antibiotic therapy in hospitalized patients

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ARTICLE INFO

Article history:

Received 20 July 2022

Accepted 24 August 2022

Available online 30 August 2022

Key words:

Antimicrobial resistance

Inpatient

Knowledge

Outcome expectations



SUMMARY

Background: The World Health Organization (WHO) has recognized antimicrobial resistance (AMR) as a top threat to global health. However, the public has an incomplete understanding of AMR and its consequences.

Aim: The aim of this study was to explore patients' understanding, perspective and health outcome expectations for antibiotic therapy within an inpatient internal medicine population.

Methods: A mixed methods study, combining a cross-sectional survey with qualitative methods. Fourteen questions (10 paper survey and four open ended interview questions) were used, and were completed by the participant in one sitting. Participants were recruited from General Internal Medicine units at two academic hospitals in Canada (convenience sample).

Findings: Thirty participants were included. Out of a scale of 1–100%, participants indicated moderate concern (mean of 40%) about getting an infection that could not be cured by antibiotics. The majority agreed that they trusted their healthcare team to decide on appropriate antibiotic therapy (mean of 81%). The participants strongly agreed (mean of 90%) that it was important to understand the rationale for their antibiotic therapy. Three themes emerged from the qualitative analysis: 1) varying levels of knowledge; 2) viewing antibiotics as beneficial while emphasizing effectiveness; and 3) trusting the healthcare team with expectations for inclusion in decision making.

Conclusion: The study results showed varying levels of patients' antibiotic knowledge and large gaps in awareness related to AMR. Exploring the role and workflow of interdisciplinary healthcare professionals may be a potential strategy to minimize patients' knowledge gap related to antimicrobial therapy and AMR.

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Introduction

The World Health Organization (WHO) has recognized antimicrobial resistance (AMR) as a top global health threat [1]. Overuse and misuse of antimicrobials accelerates AMR and multidrug resistant infections, as well as health-care associated infections, which are associated with increased mortality [2,3]. However, the public has an incomplete understanding of AMR and its consequences [4], challenging progress on containing the emergence and spread of AMR [5]. Efforts to date include various antimicrobial awareness campaigns using a multimedia approach to educate the public and dispel myths about antibiotic use [6–8]. Although targeting the general public might improve appropriate antibiotic use, its sustainability is unclear [9] and few initiatives are based on the foundations of public health or behavioural change [10]. Furthermore, recent literature has highlighted that the public continues to have misconceptions about antimicrobial use, combined with low levels of perceived personal susceptibility to resistance [11], and a lack of awareness of their personal contribution to AMR [10,12]. Existing evidence suggests that antimicrobial stewardship (AMS) initiatives address the lack of public awareness related to AMR [4], and are based on patients' existing knowledge and behaviour related to infection [13]. Patients' knowledge and awareness regarding antibiotic consumption and resistance influences health-related behaviours and the perception of responsibility [14,15]. Understanding the current state of patients' knowledge related to antibiotics and infection management is key to developing interventions that reduce inappropriate use of antibiotics [13].

Engaging patients offers a valuable opportunity to collaborate and include their perspectives in shaping policies and practice at all levels of the healthcare system, including AMS efforts [16–18]. Few studies have evaluated direct patient involvement in AMS efforts, but several points of interaction have been identified such as shared decision making at time of antibiotic prescribing, patient input in organizational design and governance, as well as policy making [11,19,20,21]. In the inpatient setting, patients receive few cues to participate in AMS, and their expectations regarding health outcomes related to antibiotic therapy are not well understood. Furthermore, understanding how patients can be engaged as stewards of antibiotics is needed to improve public health initiatives and promote healthy behaviours associated with the appropriate use of antibiotics [21]. In this context, a study was undertaken to explore patients' understanding, perspectives, and health outcome expectations for antibiotic therapy within an inpatient internal medicine cohort.

Methods

Study design

We conducted a mixed methods study, combining a cross-sectional survey with qualitative methods. The quantitative survey was aimed at facilitating focused opinion on patient perspectives and knowledge, whilst the interview questions were intended to complement the findings by facilitating open-ended discussion and more depth. Approval was obtained from the Research Ethics Board (REB) – REB number: 19-5357. Convenience sampling was used and participants were

recruited from six inpatient general internal medicine (GIM) units at two academic hospitals in Canada. Five participants were interviewed from each GIM unit for a total of 30 participants. Interviews were performed until themes were repeatedly observed or saturation of themes was achieved [22].

Study participants

Potential participants were identified by generating a daily list of all patients admitted to each GIM unit using a validated electronic clinical database. Patients identified to be on antibiotics were further screened for inclusion criteria weekly every Monday and Thursday. The study was conducted from June to August 2019. Eligibility criteria were confirmed with the patient chart. Electronic health records were utilized to confirm antibiotic type, rationale, date of initiation, and the participant's age.

The inclusion criteria included: admitted to hospital internal medicine service; at least 18 years of age; receiving at least one antibiotic for a minimum of 24 hours for the treatment of a new or recurrent, suspected or confirmed infection; and able to provide informed consent. The exclusion criteria included: requiring a substitute decision-maker, unable to speak and understand English, being on isolation precautions, receiving standard prophylactic antibiotic treatment for pre-admission conditions, and receiving antibiotics prescribed prior to admission.

Prior to the interviews, informed and signed consent was obtained by the investigators (registered nurses with graduate and doctoral degrees). Interview questions were developed by the study team, reviewed and revised by the Patient Education Network for clear language and readability, and further reviewed by the Antimicrobial Stewardship Program (ASP) research team for internal validity. Interview questions were piloted with non-patients (i.e. clinical colleagues, lay members known to the investigators) prior to patient interviews and revised based on the feedback.

Methodology

Fourteen questions (10 paper survey and four open ended interview questions) were used for this study. Surveys and interviews were administered together by the investigators, and took an average of 30 minutes to complete. Close-ended questions were responded by the participant using a paper questionnaire. A visual analog scale line was used to measure responses for question 6 (Supplementary data S1). Participants responded on an interval scale adapted from the traditional Likert scale that measured their agreeability with statements related to antibiotic therapy, from 0% (as never agreeing with the statement) to 100% (as always agreeing with the given statement). Participants were allotted approximately 30 minutes to complete both the survey and interview.

Analysis

All data was analyzed using Microsoft Excel. Close-ended interview question data was analyzed using directed content analysis. Verbal responses were voice recorded and later transcribed by investigators for content analysis. Identifying codes and categorizing predominant themes was conducted independently and manually by each of the three investigators

followed by meetings to ensure consensus for the development of the final coding schema and emerging themes.

Results

Thirty participants were included. During the screening period 1,542 patients were screened, with 437 patients (28%) receiving antibiotic therapy. Of the patients receiving antibiotics, 407 were excluded. Rationale for exclusion included: isolation (19%), confusion or altered level of consciousness (18%) and non-English speaking patients (13%) (Table I) (Supplementary data S2). The mean number of days of antibiotic therapy at the time of interview was 3.4 and median was 2.

Survey results

The mean and median age of participants was 61 years. Participants self-identified as: 17 female, 12 male and one other. More than half of participants had between two and four hospital admissions in the past 12 months. One third of participants had a single hospital admission and 13% had five or more admissions (Table II).

Out of a scale of 1–100%, patients identified physicians on average 42% of the time as the healthcare provider they felt most comfortable approaching with questions about their antibiotic treatment, followed by pharmacists (26%), nurses (21%), and nurse practitioners (11%) (Table III).

There was moderate concern (mean 40%) from participants related to getting an infection that could not be cured by antibiotics. The majority (mean 81%) of participants agreed that they trusted their healthcare team to decide on appropriate antibiotics. There was minimal support (mean 21%) for receiving antibiotics when not necessary. There was moderate (mean 62%) preference to receive antibiotics for the least number of days possible. The participants strongly agreed

Table I
Screening of patients receiving antibiotics $n=437$

Exclusion criteria	Number (%) of total receiving antibiotics
Participated in study	30 (6.9)
Isolation	84 (19.2)
Altered level of consciousness/ confusion/behavioural safety concern	79 (18.1)
Non-English speaking	55 (12.6)
Discharged/Deceased	44 (10.1)
Antibiotics pre-admission	34 (7.8)
Already interviewed	26 (5.9)
Non-verbal	22 (5.0)
Unavailable/Out of department	22 (5.0)
Declined participation	19 (4.3)
Sample participation achieved on unit	15 (3.4)
Antibiotics < 24 h	7 (1.6)

*Unavailable/Out of department included: patient sleeping, off the unit in a diagnostic test, had visitors, were unwell or experiencing acute illness, out of the department on pass, preparing for imminent discharge, were not reached on day of screening, transferred to another unit.

Table II
Participant demographics $n = 30$

Characteristic	Value (%) of total participants
Sex (as identified)	
Female	17 (56.7)
Male	12 (40.0)
Other	1 (3.3)
Highest level of education	
Elementary School	1 (3.3)
High School	13 (43.3)
College Diploma	4 (13.3)
Bachelor's Degree	5 (16.7)
Masters/PhD	7 (23.3)
Employment status	
Casual	2 (6.7)
Full-Time	5 (16.7)
Part-time	1 (3.3)
Retired	14 (46.7)
Unemployed	8 (26.7)
Reported number of hospital visits in the past year	
1	10 (33.3)
2	8 (26.7)
3–4	8 (26.7)
5 or more	4 (13.3)
Number of antibiotics prescribed at time of interview	
1	19 (63.3)
2	11 (36.7)

(mean 90%) that it was important to understand rationale for their antibiotic therapy (Table IV).

Emerging themes

The following themes emerged from the qualitative analysis: 1) varying levels of knowledge; 2) viewing antibiotics as beneficial while emphasizing effectiveness; and 3) trusting the healthcare team with expectations for inclusion in decision-making.

Varying levels of knowledge

Many of the participants were aware that they had an infection and could identify the source. However, in-depth knowledge or understanding of infection process, transmission, and antibiotic choice was very limited.

Table III
Survey Question: "Who would you be most comfortable approaching with questions about your antibiotic treatment plan while you are in the hospital? (Circle 1 that applies best)"

Healthcare provider	Value (%) of total selections
Doctor	22 (41.5)
Pharmacist	14 (26.4)
Nurse	11 (20.8)
Nurse Practitioner	6 (11.3)
None of the above	0 (0.0)

*The total number of responses is greater than 30, as many participants circled several healthcare providers.

Table IV

Survey Question: "How often do you agree with the statement?"

Statement	Mean % agreement	Median % agreement
I am worried about getting an infection that cannot be cured by antibiotics.	40	39
I trust my healthcare team to decide what antibiotics I need.	81	84
I prefer to get antibiotics even if I may not need them.	21	9
I prefer to get antibiotics for the least number of days possible.	62	58
It is important for me to understand why I need to take antibiotics.	90	95

Many participants acknowledged they had minimal or no understanding of their antibiotic treatment, side effects, length of treatment, or route of administration. Common beliefs included intravenous being superior to oral therapy, and combination being superior to single antibiotic therapy.

"I know very little about what I specifically, what I'm receiving." [P29]

"I really, I don't know ... I just do what they tell me" [P28]

"I would assume that the IV ones are far more effective, quicker acting, that's probably why they wouldn't give you an oral." [P8]

The majority of participants had never heard of antibiotic resistance even when prompted with the more vernacular term "superbugs". Participants with minimal understanding of antibiotic resistance linked resistance to antibiotic ineffectiveness in the human body rather than bacteria.

"Antibiotic resistance? No." [P12] *"I don't, it's my first time to hear it from you."* [P20]

Participants with an accurate understanding of antibiotic resistance valued the preservation of antibiotics and were able to acknowledge the role for stewardship. They expressed fear for antibiotic ineffectiveness in the future and did not favour prolonged antibiotic therapy. Notably, they perceived antibiotic resistance to be an issue external to their personal experience and not a concern for their current infection.

Viewing antibiotics as beneficial while emphasizing effectiveness

The majority of participants perceived antibiotics to be "good" with the expectation for minimal harm. They expected antibiotics would be safe, reliable, and most importantly effective. High priority was placed on "feeling better", with patients believing that antibiotics are necessary to save their life.

Antibiotic efficacy was the most commonly expressed expectation that emerged from the interviews. A positive outcome was perceived to be complete resolution of the infection and its associated symptoms without infection recurrence. Some participants mentioned efficiency and correct dosing to be of added importance. Others perceived higher doses to give optimal results, providing reassurance for effectiveness.

"The most important thing about the treatment is that it's effective and that it doesn't leave lasting damage on other organs or aspects of my body" [P2]

"The most important thing is to get better." [P4]

Trusting the healthcare team with expectations for inclusion in decision making

High value was assigned to previous experiences with illness and antibiotics, influencing level of desired involvement and willingness to trust decisions made by the healthcare team. Participants with prior hospital experience, and with acute and chronic illnesses, had a stronger desire to be active participants in discussions with health care teams, wanting greater involvement in decision-making. Those who had less experience with illness acknowledged their lack of antibiotic knowledge. This was given as a rationale for their limited capacity or desire to engage in discussions and drive treatment decisions.

"I'm not the expert and uh, I would defer to the prescribing doctor, and in a good institution like this, you know I trust them to make the right decision, for the right reasons" [P18]

Participants expected objective monitoring from their healthcare team, combined with evidence-based decisions. Although most trusted their care providers to be qualified and have the capacity for decision-making, participants consistently emphasized the expectation for transparency, dialogue and information-sharing.

"Well ... at least consideration be given, and an explanation provided, so then I can support that decision being made." [P14]

Discussion

Summary of main findings

We conducted a mixed-methods study on 30 hospitalized patients from two academic institutions who were prescribed antibiotics, and found that participants had varying levels of knowledge related to antibiotic therapy, and limited awareness of antibiotic resistance. This incomplete comprehension contributed to perceived limited patient empowerment for decision-making and stewardship initiatives. Nevertheless, the majority of participants expressed the importance of understanding the need for their antibiotic therapy and trust in their healthcare team to decide on the appropriate antibiotic therapy. All health care providers were identified to be approachable with questions about antibiotic therapy, however emphasis was given to physicians. These findings support that antimicrobial stewardship, and knowledge of infection and antibiotics, are essential interdisciplinary foci. It also highlights missed opportunities for pharmacists, nurses, and nurse practitioners who have direct contact with patients and their families.

Comparison to the literature

Patient perspectives are explored in other studies [5,9,12,13,16,23], however, they are primarily in the outpatient setting, outside of Canada, and limited in focus (e.g. upper respiratory tract infections). Results of this study are supported by existing literature, finding patients to have misconceptions about antimicrobial use, low levels of perceived personal susceptibility to resistance, and a lack of awareness of their personal contribution to AMR [12,21]. Many participants also identified their lack of capacity to understand their treatment. This power imbalance is supported in the literature where patients perceive their clinicians to be experts. Patients can become entrenched in socially sanctioned roles that create barriers for them to communicate their concerns and priorities [24].

Strengths and limitations

This is one of few studies, and only study in Canada, that focuses on hospitalized patients' knowledge and outcome expectations related to antibiotic therapy. We were able to show the level of trust that inpatients had on different members of the interdisciplinary care team, so far not a focus of previous studies. Two investigators conducted the interviews, and three independent coders were used for the thematic analysis to maximize quality of findings. There was variability in patients interviewed, providing a range of perspectives with participants from six medicine units across two tertiary academic hospitals. Quantitative trends in agreeability statements were reflective of themes that emerged from qualitative interviews, thus supporting survey validity to accurately measure participant perspectives. Additionally, our use of an adaptation of the Likert scale using an interval rather than ordinal scale, allowed us to observe nuances in perceptions about antibiotic therapy and care, and minimized the Hawthorne effect.

The study sample was limited to medicine ward patients receiving antibiotics thus impacting transferability of the findings. However, patients on the medicine ward comprise a significant proportion of hospitalized patients prescribed antibiotics. Previous studies have shown differences between limited English and proficient English patients (e.g. increased risk of readmissions, and emergency revisits after hospitalization) [25]. The participants of our study were English speaking and had literacy skills, thus presenting a limitation. English-speaking participants may not have been representative of hospital demographics, located in a multicultural urban setting. Isolated patients were not included in the study and therefore, their corresponding illnesses and understanding of AMR and antibiotics were also excluded. Some of the findings coincided with the culture of being admitted to an academic teaching hospital (e.g. having a team approach to care, greater staffing resources, and having an active ASP team). Sample size for the questionnaire portion was small, posing a limitation for quantitative data analysis and conclusion. The focus of this study was specific to antibiotics rather than antimicrobials.

The use of a behavioural change framework or model may have provided a more systematic way of mapping perceptions found to predictions of future behaviour. Our findings however namely: varying levels of knowledge and expectations of inclusion in decision making by the healthcare team, are

comparable to that of an earlier study (Heid *et al.*, 2016) which made use of the Health Belief Model to develop interview questions and interpret findings [21].

Additionally, we are unable to speculate on the effects of the COVID-19 pandemic because the study was conducted during a prior time period. Future studies that incorporate seasonal differences could provide some interesting findings. Likewise studying the patient's role in other infection control factors such as handwashing, general cleanliness, and nutrition was out of scope of our article, but could provide another avenue for patient engagement.

Implications for practice and future directions

Our findings draw out limitations in public knowledge about antibiotic therapy and antimicrobial resistance that could be targeted in future policy and practice initiatives. Although a formal evaluation is warranted, our findings suggest that existing public campaigns in Canada may not be effective, and renewed strategies that are multimodal, targeted, and are informed by behaviour science theory are needed [26]. Improving information sharing and knowledge translation with patients is essential, as they have identified a desire to have greater knowledge and understanding of infection and antibiotic treatment. There is a need to further evaluate the role and workflow of pharmacists, nurses and nurse practitioners to close identified knowledge gaps and increase patient participation in the decision making around antibiotic therapy in an inpatient setting. Clinicians and healthcare professionals have a responsibility to meet patient expectations by having knowledge and expertise in appropriate antimicrobial therapy. Patient education and recommendations provided by interdisciplinary health care professionals should incorporate patient priorities and concerns.

There is potential for future research by expanding the survey questionnaire to increase validity of the quantitative data. Furthermore, nurses were identified as healthcare providers that patients felt comfortable approaching with questions about antibiotics. Greater engagement and education of nurses to be involved in AMS initiatives should be promoted to ensure continuity of care and that consistent messaging is communicated to patients.

Conclusion

We found varying levels of patients' antibiotic knowledge and large gaps in awareness related to antibiotic resistance. Closing this knowledge gap could offer an opportunity to engage patients as antibiotic stewards. Exploring the role and workflow of interdisciplinary healthcare professionals may be a potential strategy to minimize patients' knowledge gap related to antibiotic therapy and antimicrobial resistance.

Acknowledgements

We thank the participants of the study for their time.

Contributory statements

L.J. and E.C. conceptualized and formulated the overarching research goals and aims. Furthermore, they conducted

the investigation, project administration, and visualization of the research. L.J., E.C., L. Jeffs collected and analyzed the data. L.J., E.C. L. Jeffs, A.M., and C.B. developed the research methodology. L.J., A.M., and Y.N. provided the necessary materials for the conduct of the study. L.J., A.M., and C.B. provided the oversight and leadership responsibility for this research project. L.J. and E.C. prepared the original draft of this manuscript, and all authors reviewed and edited the content. D.S. prepared and formatted the manuscript for publication.

Conflict of interest statement

We have no conflict of interest to declare.

Funding source

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.infpip.2022.100245>.

References

- [1] World Health Organization. Ten threats to global health in 2019. 2019. <https://www.who.int/emergencies/ten-threats-to-global-health-in-2019>. [Accessed 15 September 2019].
- [2] O'Neill J (chair). The review on antimicrobial resistance. Antimicrobial resistance: tackling a crisis for the Health and Wealth of Nations. 2014. <https://amr-review.org/>. [Accessed 15 September 2019].
- [3] Stevens V, Dumyati G, Fine LS, Fisher SG, van Wijngaarden E. Cumulative antibiotic exposures over time and the risk of *Clostridium difficile* infection. *Clin Infect Dis* 2011;53(1):42–8.
- [4] Micallef C, Kildonaviciute K, Castro-Sánchez E, Scibor-Stepien A, Santos R, Aliyu SH, et al. Patient and public understanding and knowledge of antimicrobial resistance and stewardship in a UK hospital: Should public campaigns change focus? *J Antimicrob Chemother* 2017;72:311–4.
- [5] Gualano MR, Gili R, Scaioli G, Bert F, Siliquini R. General population's knowledge and attitudes about antibiotics: a systematic review and meta-analysis. *Pharmacoepidemiol Drug Saf* 2015;24:2–10.
- [6] Choosing Wisely Canada. Choosing Wisely Canada and Public Health Ontario team up to fight antibiotic overuse in Ontario. 2017. <https://choosingwiselycanada.org/perspective/cwc-pho-teamup-antibiotic-overuse/>. [Accessed 15 September 2019].
- [7] Pan-Canadian Public Health Network. Antimicrobial stewardship. 2016. <http://www.phn-rsp.ca/pubs/anstew-gestan/index-eng.php>. [Accessed 15 September 2019].
- [8] Do bugs need drugs? Antimicrobial stewardship. 2018. <http://www.dobugsneeddrugs.org/health-care-professionals/antimicrobial-stewardship/>. [Accessed 15 September 2019].
- [9] Cross EL, Tolfree R, Kipping R. Systematic review of public-targeted communication interventions to improve antibiotic use. *J Antimicrob Chemother* 2017;72:975–87.
- [10] McParland JL, Williams L, Gozdzielewska L, Young M, Smith F, MacDonald J, et al. What are the 'active ingredients' of interventions targeting the public's engagement with antimicrobial resistance and how might they work? *Br J Health Psychol* 2018;23:804–19.
- [11] Légaré F, Labrecque M, Cauchon M, Castel J, Turcotte S, Grimshaw J. Training family physicians in shared decision making to reduce the overuse of antibiotics in acute respiratory infections: a cluster randomized trial. *CMAJ* 2012;184:E726–34.
- [12] McCullough AR, Parekh S, Rathbone J, Del Mar CB, Hoffman TC. A systematic review of the public's knowledge and beliefs about antibiotic resistance. *J Antimicrob Chemother* 2016;71:27–33.
- [13] Norris P, Chamberlain K, Dew K, Gabe J, Hodgetts D, Madden H. Public beliefs about antibiotics, infection and resistance: a Qualitative Study. *Antibiotics* 2013;2:465–76.
- [14] Giannitsioti E, Athanasia S, Plachouras D, Kanellaki S, Bobota F, Tzepati G, et al. Impact of patients' professional and educational status on perception of an antibiotic policy campaign: A pilot study at a university hospital. *J Glob Antimicrob Resist* 2016;6:123–7.
- [15] Ancillotti M, Eriksson S, Veldwijk J, Fahlquist JN, Andersson DI, Godsken T. Public awareness and individual responsibility needed for judicious use of antibiotics: a qualitative study of public beliefs and perceptions. *BMC Public Health* 2018;18:1153.
- [16] Popescu I, Neudorf K, Kossey SN. Engaging patients in antimicrobial resistance and stewardship. *Int J Health Governance* 2016;21:180–93.
- [17] Canadian Institute for Health Information. Patient experience. 2019. <https://www.cihi.ca/en/patient-experience>. [Accessed 15 September 2019].
- [18] Primary care Patient experience survey: support guide. Health Quality Ontario. 2015. <http://www.hqontario.ca/Portals/0/documents/qi/primary-care/primary-care-patientexperience-survey-support-guide-en.pdf>. [Accessed 15 September 2019].
- [19] Ewers T, Knobloch MJ, Safdar N. Antimicrobial stewardship: the role of the patient. *Curr Treat Options Infect Dis* 2017;9:92–103.
- [20] Blyer K, Hulton L. College students, shared decision making, and the appropriate use of antibiotics for respiratory tract infections: a systematic literature review. *J Am Coll Health* 2016;64:334–41.
- [21] Heid C, Knobloch MJ, Schulz LT, Safdar N. Use of the health belief model to study patient perceptions of antimicrobial stewardship in the acute care setting. *Infect Control Hosp Epidemiol* 2016;37:576–82.
- [22] Saunders B, Sim J, Kingstone T, Baker S, Waterfield J, Bartlam B, et al. Saturation in qualitative research: exploring its conceptualization and operationalization. *Qual Quantity* 2018;52(4):1893–907.
- [23] Farley E, van den Bergh D, Coetzee R, Stewart A, Boyles T. Knowledge, attitudes and perceptions of antibiotic use and resistance among patients in South Africa: A cross-sectional study. *S Afr J Infect Dis* 2019;34:9.
- [24] Berry LL, Danaher TS, Beckham D, Awdish RLA, Mate KS. When patients and their families feel like hostages to health care. *Mayo Clin Proc* 2017;92:1373–81.
- [25] Rawal S, Srighanthan J, Vasantharoopan A, Hu H, Tomlinson G, Cheung AM. Association between limited English proficiency and revisits and readmissions after hospitalization for patients with acute and chronic conditions in Toronto, Ontario, Canada. *JAMA* 2019;322:1605–7.
- [26] Ashiru-Oredope D, Hopkins S. Antimicrobial resistance: moving from professional engagement to public action. *J Antimicrob Chemother* 2015;70(11):2927–30.